

Appl. No. 09/533,421  
Amd. Dated October 11, 2005  
Reply to Office Action of July 26, 2005

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

Claim 1 (previously presented): A method for controlling the operation of a flexible cross-connect system which has a plurality of cards including an active control unit, a redundant control unit, a plurality of interface cards, an active cross-connect unit, a redundant cross-connect unit, and a backplane forming a plurality of data buses, the data buses acting as communications links between the plurality of cards, the method comprising:

monitoring the operational status for each one of the plurality of cards and each one of the communications links between the plurality of cards within the flexible cross-connect system;

determining when the operational status of any of the plurality of cards or the communications links between the plurality of cards indicates that the card or the communications link between the plurality of cards is non-operational;

autonomously switching from the non-operational active card to an associated redundant card when the operational status of the non-operational active card is determined or from the non-operational active communications link between the plurality of cards to an associated redundant communications link between the plurality of cards when the operational status of the non-operational active communications link between the plurality of cards is determined;

determining when the non-operational active card or the non-operational active communications link between the plurality of cards requires maintenance; and

reporting that maintenance is required for the non-operational active card or the non-operational active communications link between the plurality of cards when it is determined that the non-operational active card or the non-operational active communications link between the plurality of cards requires maintenance.

Claim 2 (canceled)

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Claim 3 (original): The method of claim 1, further comprising preventing communications from being sent to the non-operational active card or over the non-operational active communications link.

Claim 4 (original): The method of claim 3, wherein a card is flagged with a non-operational status if the card is receiving a software upgrade.

Claim 5 (original): The method of claim 1, further comprising  
recording data related to each card in a database; and  
updating the database to reflect changes to any of the wherein the cards, wherein the changes include maintenance performed on, replacement of, or user configuration changes.

Claim 6 (previously presented): A method for controlling the operation of a flexible cross-connect system which has a plurality of cards including an active control unit, a redundant control unit, a plurality of interface cards, an active cross-connect unit, a redundant cross-connect unit, and a backplane forming a plurality of data buses, the data buses acting as communications links between the plurality of cards, the method comprising:

monitoring the operational status for each one of the plurality of cards and each one of the communications links between the plurality of cards within the flexible cross-connect system;

determining when the operational status of any of the plurality of cards or the communications links indicates that the card or the communications link between the plurality of cards is non-operational;

autonomously switching from the non-operational active card to an associated redundant card when the operational status of the non-operational active card is determined or from the non-operational active communications link between the plurality of cards to an associated redundant communications link between the plurality of cards when the operational status of the non-operational active communications link between the plurality of cards is determined; and

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detecting and reporting when any card or communications link between the plurality of cards has a change in operational status.

Claim 7 (original): The method of claim 6, wherein said detecting and reporting includes:

tracking how long the change in operational status persists;  
determining when the change in operational status has persisted for at least a predetermined amount of time; and  
reporting the change in operational status when the predetermined amount of time is exceeded.

Claim 8 (original): The method of claim 7, wherein said detecting and reporting further includes discarding the change in operational status when the change in operational status does not persist for the predetermined amount of time.

Claim 9 (previously presented): The method of claim 1, wherein the flexible cross-connect system is a first node within a network, and further comprising maintaining a connection map for the network.

Claim 10 (previously presented): A computer program embodied on a computer readable medium for controlling the operation of a flexible cross-connect system which has a plurality of cards including an active control unit, a redundant control unit, a plurality of interface cards, an active cross-connect unit, a redundant cross-connect unit, and a backplane forming a plurality of data buses, the data buses acting as communications links between the plurality of cards, the computer program comprising:

a code segment for monitoring the operational status for each one of the plurality of cards and each one of the communications links between the plurality of cards within the flexible cross-connect system;

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a code segment for determining when the operational status of any of the plurality of cards or the communications links between the plurality of cards indicates that the card or the communications link between the plurality of cards is non-operational;

a code segment for autonomously switching from the non-operational active card to an associated redundant card when the operational status of the non-operational active card is determined or from the non-operational active communications link between the plurality of cards to an associated redundant communications link between the plurality of cards when the operational status of the non-operational active communications link between the plurality of cards is determined;

a code segment for determining when the non-operational active card or the non-operational active communications link between the plurality of cards requires maintenance; and

a code segment for reporting that maintenance is required for the non-operational active card or the non-operational active communications link between the plurality of cards.

Claim 11 (canceled)

Claim 12 (original): The computer program of claim 10, further comprising a code segment for preventing communications from being sent to the non-operational active card or over the non-operational active communications link.

Claim 13 (original): The computer program of claim 12, wherein a card is flagged with a non-operational status if the card is receiving a software upgrade.

Claim 14 (original): The computer program of claim 10, further comprising a code segment for recording data related to each card in a database; and

a code segment for updating the database to reflect changes to any of the cards, wherein the changes include maintenance performed on, replacement of, or user configuration changes

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Claim 15 (previously presented): A computer program embodied on a computer readable medium for controlling the operation of a flexible cross-connect system which has a plurality of cards including an active control unit, a redundant control unit, a plurality of interface cards, an active cross-connect unit, a redundant cross-connect unit, and a backplane forming a plurality of data buses, the data buses acting as communications links between the plurality of cards, the computer program comprising:

a code segment for monitoring the operational status for each one of the plurality of cards and each one of the communications links between the plurality of cards within the flexible cross-connect system;

a code segment for determining when the operational status of any of the plurality of cards or the communications links between the plurality of cards indicates that the card or the communications link between the plurality of cards is non-operational;

a code segment for autonomously switching from the non-operational active card to an associated redundant card when the operational status of the non-operational active card is determined or from the non-operational active communications link between the plurality of cards to an associated redundant communications link between the plurality of cards when the operational status of the non-operational active communications link between the plurality of cards is determined; and

a code segment for detecting and reporting when any card or communications link between the plurality of cards has a change in operational status.

Claim 16 (original): The computer program of claim 15, wherein said code segment for detecting and reporting includes:

a code segment for tracking how long the change in operational status persists;

a code segment for determining when the change in operational status has persisted for at least a predetermined amount of time; and

a code segment for reporting the change in operational status when the predetermined amount of time is exceeded

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Claim 17 (original): The computer program of claim 16, wherein said code segment for detecting and reporting further includes a code segment for discarding the change in operational status when the change in operational status does not persist for the predetermined amount of time.

Claim 18 (previously presented): The computer program of claim 10, wherein the flexible cross-connect system is a first node within a network, and further comprising a code segment for maintaining a connection map for the network.

Claim 19 (previously presented): A method for controlling the operation of a flexible cross-connect system, the flexible cross-connect system having a plurality of cards, an active control unit, a redundant control unit, an active cross-connect unit, a redundant cross-connect unit, and a backplane forming a plurality of data buses, the data buses acting as communications links between the plurality of cards, the plurality of cards including a plurality of interface cards, the method comprising:

monitoring the operational status for each one of the plurality of cards and each one of the communications links between the plurality of cards within the flexible cross-connect system;

determining when the operational status of any one of the plurality of cards or any one of the communications links between the plurality of cards indicates that the card is a non-operational card or the communications link between the plurality of cards is a non-operational communications link;

autonomously switching from the non-operational active card to an associated redundant card when the operational status of the non-operational active card is determined or from the non-operational active communications link between the plurality of cards to an associated redundant communications link between the plurality of cards when the operational status of the non-operational active communications link between the plurality of cards is determined;

determining when the non-operational active card or the non-operational active communications link between the plurality of cards requires maintenance;

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reporting that maintenance is required for the non-operational active card or the non-operational active communications link when it is determined that the non-operational active card or the non-operational active communications link between the plurality of cards requires maintenance; and

maintaining a connection map associated with the flexible cross-connect system, the flexible cross-connect system being a node in a network, the connection map being arranged to indicate statuses of nodes with the network, wherein when it is determined that the operational status of any one of the plurality of cards or any one of the communications links between the plurality of cards indicates that the card is non-operational or the communications link between the plurality of cards is non-operational, the connection map is updated to indicate a change in status of the flexible cross-connect system.

Claim 20 (previously presented): An apparatus suitable for controlling the operation of a flexible cross-connect system which has a plurality of cards including an active control unit, a redundant control unit, a plurality of interface cards, an active cross-connect unit, a redundant cross-connect unit, and a backplane forming a plurality of data buses, the data buses acting as communications links between the plurality of cards, the apparatus comprising:

means for monitoring the operational status for each one of the plurality of cards and each one of the communications links between the plurality of cards within the flexible cross-connect system;

means for determining when the operational status of any of the plurality of cards or the communications links between the plurality of cards indicates that the card or the communications link between the plurality of cards is non-operational;

means for autonomously switching from the non-operational active card to an associated redundant card when the operational status of the non-operational active card is determined or from the non-operational active communications link between the plurality of cards to an associated redundant communications link between the plurality of cards when the operational status of the non-operational active communications link between the plurality of cards is determined;

means for determining when the non-operational active card or the non-operational active communications link between the plurality of cards requires maintenance; and

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means for reporting that maintenance is required for the non-operational active card or the non-operational active communications link between the plurality of cards when it is determined that the non-operational active card or the non-operational active communications link between the plurality of cards requires maintenance.

Claim 21 (previously presented): An apparatus for controlling the operation of a flexible cross-connect system which has a plurality of cards including an active control unit, a redundant control unit, a plurality of interface cards, an active cross-connect unit, a redundant cross-connect unit, and a backplane forming a plurality of data buses, the data buses acting as communications links between the plurality of cards, the apparatus comprising:

a monitor, the monitor being arranged to monitor the operational status for each one of the plurality of cards and each one of the communications links between the plurality of cards within the flexible cross-connect system;

a first determinator, the first determinator being arranged to determine when the operational status of any of the plurality of cards or the communications links between the plurality of cards indicates that the card or the communications link between the plurality of cards is non-operational;

a switch, the switch being arranged to autonomously switch from the non-operational active card to an associated redundant card when the operational status of the non-operational active card is determined or from the non-operational active communications link between the plurality of cards to an associated redundant communications link between the plurality of cards when the operational status of the non-operational active communications link between the plurality of cards is determined;

a second determinator, the second determinator being arranged to determine when the non-operational active card or the non-operational active communications link between the plurality of cards requires maintenance; and

a reporting arrangement, the reporting arrangement being arranged to report that maintenance is required for the non-operational active card or the non-operational active communications link between the plurality of cards when it is determined that the non-operational active card or the non-operational active communications link between the plurality of cards requires maintenance.



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Claim 22 (new): The method of claim 1 wherein the communications links between the plurality of cards include at least a first communications link between the plurality of interface cards and at least a second communications link between at least one interface card of the plurality of interface cards and one at least one of the active cross-connect unit, the redundant cross-connect unit, the active control unit, or the redundant control unit.